

Remarks

The Applicants have added new Claims 16-23. Claims 16 through 19 recite that the steel sheet has a iron loss of 6 W/kg or less. Those claims depend from Claims 2-5, respectively. Support may be found on page 31 of the Applicants' specification, for example.

New Claims 20-23 recite that the steel sheet has a yield strength of 450 MPa or more. Claims 20-23 depend from Claims 2-5, respectively. Support may be found on page 34 of the Applicants' specification and elsewhere. Entry into the official file and consideration on the merits is respectfully requested.

The Applicants enclose copies of English abstracts or relevant excerpts of the Japanese publications not considered in the prior Information Disclosure Statement. A new PTO-1449 form is enclosed for the Examiner's convenience. The Applicants respectfully request that the re-submitted publications be examined on the merits and that the Form PTO-1449 be labeled in the appropriate manner.

Claims 2-5 stand rejected under 35 USC §102 as anticipated by or under 35 USC §103 as obvious over JP '919. The Applicants note with appreciation the Examiner's detailed comments hypothetically applying JP' 919 against those claims. The Applicants nonetheless respectfully submit that JP '919 neither anticipates nor renders obvious Claims 2-5. Reasons are set forth below.

The rejection points to the JP '919 abstract and Table 3 to support an overlap of the compositional elements. Then, the rejection frankly acknowledges that JP '919 does not disclose the volume ratio of Cu precipitates in the crystal grain interior as in the range of from 0.2% to 2% and that the average particle size of the Cu precipitates is in the range of from 1 to 2 nm. The Applicants agree.

The rejection then relies on inherency for the claimed characteristics concerning the Cu precipitates based on the above-mentioned overlap of the constitutional elements. The test for application of inherency is that the characteristics of the claimed product must “necessarily” be present. It is not enough that the characteristics might be present, could be present or are even likely present. They must “necessarily” be present. The Applicants respectfully submit that the record does not reflect that the product characteristics would “necessarily” be present.

The rejection states that JP '919 teaches a method that is substantially the same as Claims 2–5. The Applicants respectfully submit that this is in error. Therefore, the assumption of the similarity of Cu precipitates made in the rejection is also in error. The Applicants enclose an English translation of JP '919 for the Examiner's convenience.

Claims 2 and 3 recite that the steel has Cu precipitates wherein a volume ratio thereof in crystal grain interior is in the range of from 0.2% to 2%, and an average particle size thereof is in the range of from 1 to 20 nm. The claimed Cu precipitates are obtained by aging treatment after finish annealing the cold rolled steel sheet as shown in the Applicants' Specification on page 44, last paragraph, page 45, first paragraph, page 49, first full paragraph, page 49, lines 19 to page 50, line 4, and page 50, line 20 to page 51, line 6.

When the aging treatment is not conducted after finish annealing, sufficient Cu precipitation cannot be obtained, like in the case that aging treatment is conducted at an insufficient condition (such as at too low a temperature). The Applicants thus invite the Examiner's attention to Table 4, especially example Nos. 5 and 15, in contrast to Nos. 2 and 13, respectively. In Nos. 5 and 15, the aging temperature is too low and, therefore, the volume ratio of Cu precipitates is insufficient. (See also page 60, lines 9 to 16.)

If the heat treatment is too high a temperature (in view of aging), Cu precipitates, if any, are too large. The Applicants thus invite the Examiner's attention to Table 4, example Nos. 9 and 18, in contrast to Nos. 2 and 13, respectively. In Nos. 9 and 18, the aging temperature is too high (i.e., at 700°C) and, therefore, the size of Cu participates is too large. (See also page 60, lines 9 to 16.)

JP '919 fails to teach or suggest conducted aging treatment. The only treatment that JP '919 teaches is to optionally conduct it after annealing (i.e., finish annealing) as stress relief annealing (or strain releasing annealing), which was conducted at 750°C in the Example. "Stress relief annealing" is disclosed on page 13, lines 3 to 5 in the enclosed English translation, which is originally located on page 4, lower right column, lines 4 to 6 of JP '919. The temperature of stress relief annealing in the Example is disclosed on page 13, lines 18 to 19 the enclosed English translation, which is originally located on page 4, lower right column, line 16 of JP '919. Therefore, JP '919 differs in an essential process feature with the method disclosed in the Applicants' Specification to produce the steel sheet of Claims 2 or 3.

The steel sheet of Claim 4 does not have Cu precipitates as defined in Claim 1, but is ready to precipitate such Cu precipitates once aged at 500°C for 10 hours. To ensure such Cu precipitation, a specific state of Cu is required at the stage after finish annealing as taught on page 49, lines 3 to 8. Page 45, second to the last line to page 46, line 15, is instructive. The cooling rate after finish annealing is one of the critical conditions to ensure such a Cu state. That is, the cooling rate must be approximately 10°C/s or more (for the steel not containing Ni as in JP '919) to ensure the amount of coarse Cu precipitates before aging to be small, thereby to ensure the size of Cu precipitate after aging to be sufficiently small. In Table 4, Nos. 4 and 14 are cooled after finish annealing at the cooling rate of less than 10°C/s and, therefore, the size of Cu precipitates after aging is larger than 20 nm as discussed on page 60, lines 4 to 8. On the other hand, in the case that the cooling rate is

approximately 10°C/s or more as shown in Nos. 2 and 13, size (and volume ratio) of Cu precipitates is appropriate. Finish annealing is described on page 11, lines 5 to 7, page 12, the last two lines, and page 13, lines 16 to 17, in the enclosed English translation, which correspond to page 3, lower right column, lines 8 to 14, page 4, lower right column, lines 1 to 2 and page 4, lower right column, line 14 in JP '919, respectively. The cooling rate after annealing is not mentioned at all. Therefore, JP '919 also fails to teach at least one essential process feature that would result in the steel sheet of Claim 4.

Furthermore, the Applicants have addressed the problem of maintaining excellent iron loss characteristics and simultaneously providing for superior punchability and high yield strength. They have discovered, among other things, that Cu plays an important role in achieving this task. Thus, the Applicants claim a range of 0.2% to 4% Cu. The Applicants have also discovered that the volume ratio of Cu precipitates in the crystal grain interior as well as the average particle size of the crystal precipitates being in the range of from 1 to 20 nm is important. As noted above, JP '919 does not disclose the volume ratio as claimed and the average particle size as claimed. There is a reason for this. The reason is that the steels produced by the Applicants with the claimed volume ratio and average particle size are different from the steels disclosed and produced in JP '919.

One of the reasons for this difference is that JP '919 has no appreciation for the aforementioned importance of Cu. This is reflected in the previously mentioned tables in JP '919. Table 1 does not include Cu at all. On the other hand, Table 3 only includes one instance where Cu is present in the amount of 0.20%. That is Alloy 5 as noted in the rejection. However, the characteristics of Alloy 5 from Table 3 are quite different from those as claimed by the Applicants. This is reflected by referring to Table 4 for the Alloy 5 entry such as in the iron loss amount which is 6.60 W/kg. This is sharply contrasted to the examples as set forth in the Applicants' specification

wherein the iron loss is 6 W/kg or less. In every instance, the Applicants' Examples contain the claimed amount of Cu. On the other hand, Alloy 5 of JP '919 is outside of the Applicants' iron loss of 6 W/kg or less (as now specifically claimed in new Claims 16-19). The fact that the iron loss is different means that the characteristics of the steels are different, irrespective of any overlap between the constitutional elements.

The question then arises as to why the steels are different. The difference is brought about by differences in manufacturing the steel as already demonstrated. Besides, the discussion of the methodology employed in JP '919 is somewhat limited. The Applicants, however, provide details as to their manufacturing methodology. This is particularly important as to how it affects the Cu precipitates, their volume ratio and their average particle size. Thus, the Applicants invite the Examiner's attention to pages 42-46 of the Applicants' specification which details particular efforts that the Applicants take, depending on the circumstances, to control the characteristics of the Cu precipitates. JP '919, on the other hand, does not disclose these steps. For example, at the top of page 43, the Applicants conduct a particular annealing wherein large and coarse Cu precipitates are turned into a solid solution by a particular type of heating followed by a particular type of cooling. Again, this is not disclosed in JP '919.

The Applicants even take additional specific steps when there is no Ni contained in the steel alloys. The Applicants note that JP '919 does not disclose Ni. Therefore, the Applicants' specific methodology associated with the absence of Ni is particularly applicable to JP '919 which also does not include Ni. In that situation, the Applicants seek to suppress the precipitation of Cu in their cooling step after finishing annealing such that cooling is at a particular rate to specific times. As a result, the Applicants control the volume ratio and the average particle size of the Cu precipitates in a way that impacts the resulting physical characteristics of the steel sheets.

Thus, returning back to the iron loss, the Applicants' steels have an iron loss of 6 W/kg or less with the claimed amount of Cu present. In the only case where Cu is present in JP '919, the iron loss is higher. Thus, the Applicants respectfully submit that they have factually established that the claimed steel sheets are, in fact, different from the steel sheets of JP '919, irrespective of any overlap in compositional elements. As a consequence, the Applicants respectfully submit that they have factually established that the characteristics that are allegedly "inherent" in the rejection, have not been established as being "necessarily" present. In fact, the Applicants have established that the characteristics and the alloys themselves are most likely quite different.

On the other hand, JP '919 discloses two alloys that have iron losses that are less than 6 W/kg such as Alloy 7 and Alloy 10. However, in those instances the amount of Si is outside of the claimed range in each case and there is no Cu present at all. Thus, the Applicants have also established that even when one of the physical characteristics of the steel sheet is the same as the Applicants' steels, the compositional elements themselves are outside of the Applicants' claimed range. Thus, the Applicants respectfully submit that they have established that there is in fact no overlap of all of the aspects recited in Claims 2-5. In the case of Claim 2, while there may be overlap of the compositional elements, the Applicants have established that it is not "necessarily" true that the volume ratio and average particle sizes of the Cu precipitates would be present in the JP '919 steels. In fact, the Applicants respectfully submit that they have established that they are not likely to be the same. Similar arguments can be made for Claims 3-5. Withdrawal of the rejection is respectfully requested.

The Applicants have also added new Claims 20-23 which are directed to the yield strength being 450 MPa or more. JP '919 does not disclose this claimed characteristic. Also, the Applicants respectfully submit that this claimed characteristic is also not inherently present in view of the

differences established above with respect to the Cu precipitates --- which impact the yield strength.

Allowance of those claims is also respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire Application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,



T. Daniel Christenbury
Reg. No. 31,750
Attorney for Applicants

TDC/vbm
(215) 656-3381